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Radial and angular rotons in trapped dipolar gases[1] SHAI RONEN, JILA and Department of Physics, University of Colorado, Boulder, CO 80309-0440, USA, DANIELE BORTOLOTTI, JILA and Department of Physics, University of Colorado, Boulder, CO, USA; LENS and Dipartimento di Fisica, Universitá di Firenze, Italy , JOHN BOHN, JILA, NIST, and Department of Physics, University of Colorado, Boulder, CO 80309-0440, USA — We study Bose-Einstein condensates with purely dipolar interactions in oblate (pancake) traps. We find that the condensate always becomes unstable to collapse when the number of particles is sufficiently large. We analyze the instability, and find that it is the trapped-gas analogue of the "roton- maxon" instability previously reported for a gas that is unconfined in two dimensions. In addition, we find that under certain circumstances, the condensate wave function attains a biconcave shape (like a red-blood cell), with its maximum density away from the center of the gas. These biconcave condensates become unstable due to azimuthal excitation - an angular roton.

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